Appendix A – 2020 Sustainability Inventory

Executive Summary

This Appendix presents key data snapshots from Sound Transit's 2020 Annual Sustainability Progress Report and identifies resource use patterns compared to earlier years of performance. The report evaluates 2020 performance metrics, as well as performance data trends over multiple years.

Sound Transit, the region, and the planet felt the full impact of the COVID-19 pandemic in 2020. As of the release of this report, Central Puget Sound has begun to experience a slow but uneven recovery. The report illustrates that in disrupting many societal routines, the pandemic had an outsized impact on transit ridership.

In January of 2020, Sound Transit launched its Connect 2020 project, which prepared infrastructure for new light rail to the Eastside into the existing system. Connect 2020 created service disruptions during the first three months of the year and required trains to operate less frequently for 10 weeks.

In March 2020, not long after Connect 2020 was completed, public health advisories to counter the pandemic caused businesses to shutter and many office employees to work remotely. Transit ridership plummeted. In response to low ridership levels and a challenging financial outlook, Sound Transit curtailed service levels while still providing reliable service for the riders who rely on transit for travel. These conditions persisted for much of the remainder of 2020 and had an unmistakable impact on the agency's Sustainability KPIs and a number of long-term agency trends.

Please note that any statements about resource use trends and metrics in this appendix are made in absolute (totals) terms unless explicitly stated otherwise; normalized trend analyses and metrics will be explicitly labeled as such. (i.e. greenhouse gas emissions per passenger miles traveled).

The main takeaways from the year include:

- Ridership plummeted in 2020, with passenger miles traveled (PMT) across all modes decreasing by 68 percent from the prior year and unlinked passenger trips ("boardings") falling by 67 percent. Agency vehicle revenue miles (VRM) fell by a more modest 16 percent in 2020. The disparity between the decrease in service levels and the decrease in ridership illustrates the agency's commitment to providing a reliable baseline of service for frontline workers and essential transit riders.

- In tandem with decreased service levels, absolute (ie. not normalized) resource use declined across the agency, with the exception of water use, which is mainly used for irrigation. Agency diesel consumption fell by 17 percent from 2019 to 2020. Electricity for Link Light Rail traction power fell by 15 percent. Facility natural gas and non-traction power electricity consumption fell by 6 percent and 4 percent respectively.

- Total operational greenhouse gas (GHG) emissions decreased 18 percent from 2019 to 2020, due to pandemic-related reductions in resource consumption and the first full year of agency enrollment in phase 1 of the PSE Green Direct renewable power purchase agreement. This change represents the largest absolute, inter-annual GHG emission reduction since the agency started tracking this data.

Additional key findings in resource use and efficiency include:

- Agency energy use decreased by 15 percent from 2019 to 2020; absolute energy use was up 5 percent relative to the 2011 baseline.
- Absolute fleet energy use decreased 16 percent from 2019 to 2020, which mirrors the 16 percent reduction in vehicle revenue miles operated from 2019 to 2020. Meanwhile, absolute facility energy consumption only decreased 4 percent from 2019 to 2020, indicating that facility energy consumption is less dependent on levels of service provided.
- Sounder commuter rail service reduced energy consumption by 22 percent, Link light rail reduced traction power consumption by 15 percent, and ST Express reduced energy consumption by 14 percent from 2019 to 2020.
- Water use increased by 17 percent from 2019 to 2020, indicating that water use is not directly related to service levels.
- Waste diversion from landfill decreased from 36 percent in 2019 to 31 percent in 2020, which was largely attributable to decreased recycling and composting volumes due to central office workforce working remotely for most of the year.

Notes on Appendix A: This document illustrates resource use trends over time from baseline years (2010 or 2011, depending on data) and the preceding inventory year, 2019. In the following graphs, solid bars indicate total emissions, resource use, and resource costs. The trend lines show the normalized resource, either per PMT or per VRM, over time.

Ridership and Level of Service

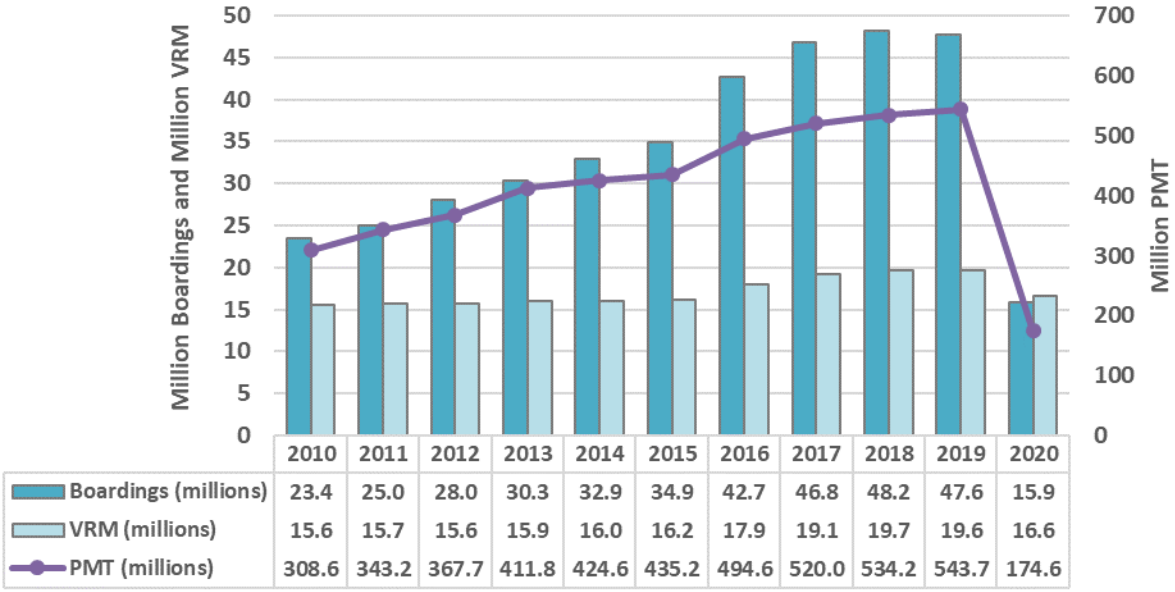
- Relative to 2010, ridership measured in boardings is down by 32 percent.
- Relative to 2010, vehicle revenue miles are up by 6 percent.
- From 2019 to 2020, boardings declined by 67 percent, passenger miles traveled declined by 68 percent and vehicle revenue miles declined by 16 percent.

Ridership has important implications for resource use. As Sound Transit's network expands, the agency anticipates total resource use will increase. In order to account for the growth of Sound Transit's service network and meaningfully interpret resource efficiency trends over time, the Sustainability Inventory normalizes data by the level of service provided by the agency (vehicle revenue miles or VRM), the number of unlinked passenger trips (boardings or UPT) and the volume and distance of overall ridership (passenger miles traveled or PMT). As a signatory to the American Public Transportation Association (APTA) Sustainability Commitment, Sound Transit has historically relied most heavily on PMT as a normalization factor because it reflects both aspects of ridership and service levels.

Boardings and PMT have generally increased year-over-year throughout the agency's history. However, 2019 saw agency wide boardings and vehicle revenue miles both decline slightly from 2018. Ridership in 2020 saw a steep decline in ridership and all other metrics of resource use from 2019 due to the COVID-19 pandemic. In 2020 PMT declined for the first time since 2010 and PMT fell across all services from 2019. With the exception of Tacoma Link, VRM in 2020 fell significantly across all services as did boardings.

Due to pandemic-related ridership levels, metrics normalized by PMT increased sharply in 2020 and cannot be compared to operational efficiency trends. Compared to previous Sustainability Inventories, this edition relies on VRM as a normalization factor as it is more indicative of service-related trends and efficiencies. Figure 1 below shows the trends of boardings, vehicle revenue miles, and passenger miles traveled since 2010.

Figure 1. Ridership, 2015-2020

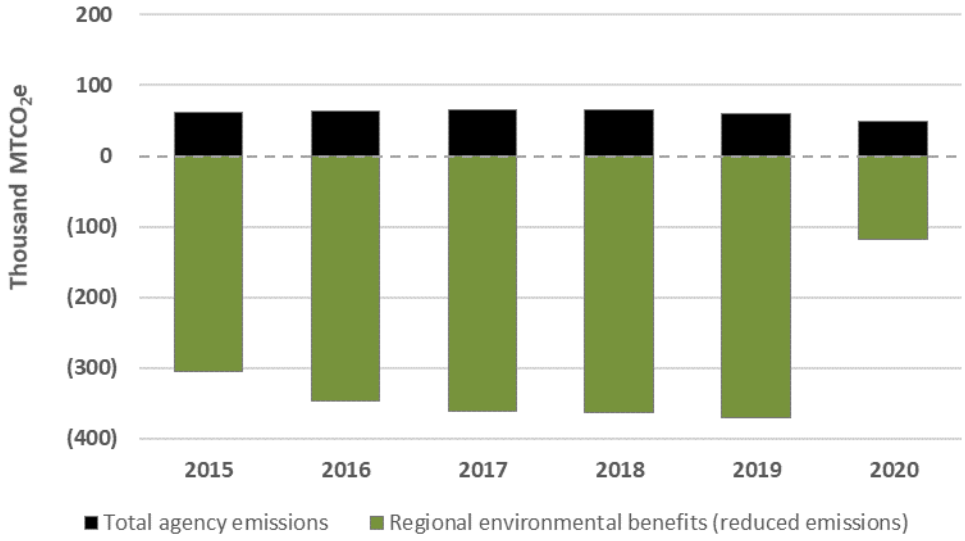


	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Boardings (millions)	23.4	25.0	28.0	30.3	32.9	34.9	42.7	46.8	48.2	47.6	15.9
VRM (millions)	15.6	15.7	15.6	15.9	16.0	16.2	17.9	19.1	19.7	19.6	16.6
PMT (millions)	308.6	343.2	367.7	411.8	424.6	435.2	494.6	520.0	534.2	543.7	174.6

Regional Environmental Benefit

Increased transit use reduces regional environmental impacts from passenger vehicles. As more people choose transit over driving, fuel consumption and greenhouse gas (GHG) emissions are reduced throughout the region. Displaced GHG emissions are a measure of the regional environmental benefit produced by transit. Sound Transit follows a 2018 methodology developed by APTA to account for emissions avoided due to transit ridership, measured in carbon dioxide equivalent (CO_2e), as shown in Figure 2 and Table 1.

Figure 2. Regional Greenhouse Gas Emissions (CO_2e) Displaced by Sound Transit Services, 2015-2020



As seen in Figure 2 above and Table 1 below, even though 2020 experienced significantly lower ridership, Sound Transit services displace more GHG emissions than they emit from operations. For every ton of GHG emissions Sound Transit emitted in 2020, the region avoided 2.4 tons of emissions through the benefits of transit. The regional environmental benefits shown in green in Figure 2 include the benefits from people taking transit instead of driving (i.e. mode shift) and reduced emissions associated with denser land use patterns supported by transit. From 2015 to 2019, these benefits were between five and six times the agency's operational emissions, in black.

Table 1. Regional Greenhouse Gas Emissions (CO_2e) Displaced by Sound Transit Services, 2020

Regional metric tons CO_2e Reduced		
Mode Shift Benefits	Land-Use Benefits	Total Benefits
22,412	96,417	118,829
Displacement ratios - CO_2e units reduced in the region per unit of CO_2e from Sound Transit operations		
Mode Shift Benefits	Land-Use Benefits	Total Benefits
0.46	1.96	2.42

The definitions for each of the identified types of benefits are below:

- **Mode shift benefits** measure the reduced GHG emissions (amount displaced) resulting from shifting from one mode of transportation (e.g., single occupancy vehicle) to another (e.g., transit), measured on a PMT basis.
- **Land use change benefits** measure the reduced carbon emissions due to the denser land use patterns supported by transit systems.

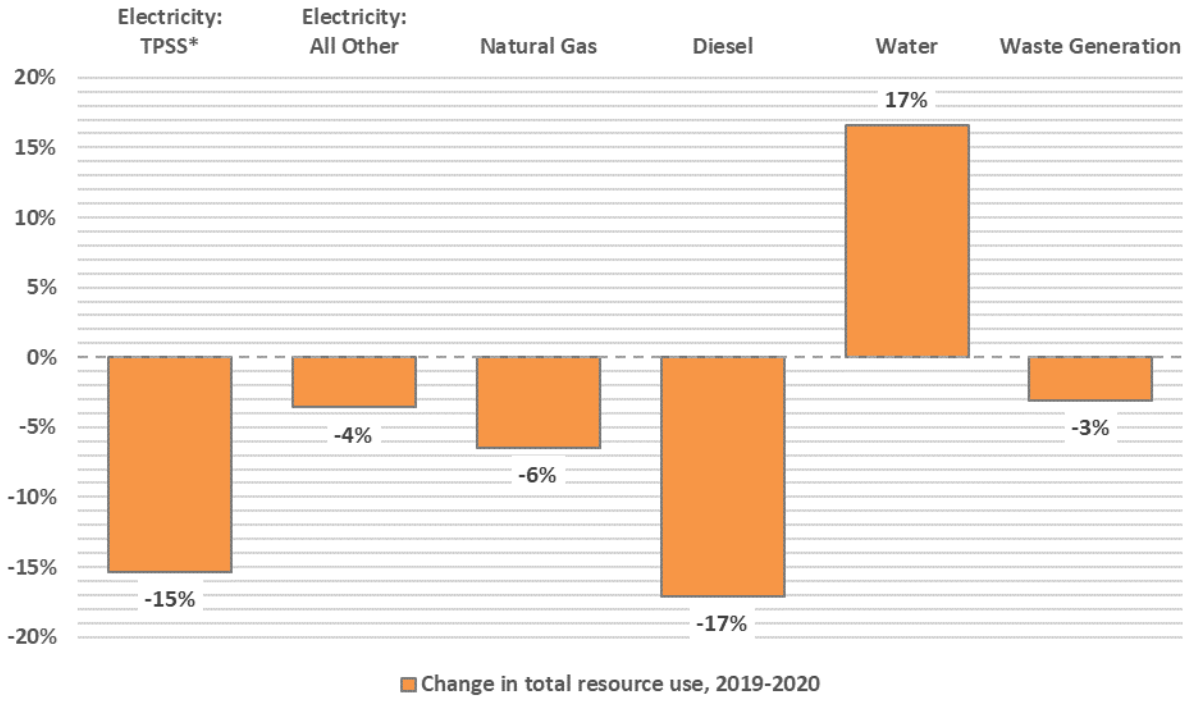
Resource Use

Total agency resource use has generally increased over time, reflecting Sound Transit's expanded system and services. Most increases in resource use have been in line with service changes and ridership increases, as well as operational equipment changes described further in the sections below.

In response to public health restrictions and diminished ridership demand during the COVID-19 pandemic, Sound Transit reduced service levels. In turn, resource use declined across all metrics, with the exception of water usage. Figure 3 below shows the change in absolute resource use from 2019 to 2020.

- Absolute resource use for traction power electricity (i.e. Link light rail propulsion) declined 15 percent from 2019 to 2020. All other electricity consumption declined 4 percent.
- Total agency diesel consumption fell by 17 percent from 2019 to 2020.
- Facility natural gas consumption declined 6 percent in absolute terms from 2019-2020. Because Central Link OMF has historically been the single largest consumer of natural gas in any given year, the natural gas decrease is likely attributable to decreased operational activity at that facility.
- Absolute water use increased by 17 percent from 2019 to 2020.
- Absolute waste generation declined three percent from 2019 to 2020.

Figure 3. Change in Absolute Resource Use, 2019-2020



**Note: Electricity: TPSS is normalized by Link PMT, as TPSS is exclusively associated with the Link line of business. All other resource categories are normalized by total agency PMT, as they span multiple lines of business.*

Fleet Energy Use

- Since 2011, total fleet energy use has grown by 3 percent.
- From 2019 to 2020, total fleet energy declined by 16 percent.
- Per vehicle mile traveled, total fleet energy has declined by 3 percent since 2011 and by 1 percent since 2019.

Prior to the COVID-19 pandemic, fleet energy use (in MMBTU) across Sound Transit's three modes—ST Express bus, Sounder commuter rail, and Link light rail—had been increasing slowly over time as more service has been provided. Service became more efficient per PMT as system ridership grew significantly faster than level of service (VRM). Despite substantial pre-pandemic increases in service, 2020 reversed prevailing revenue fleet resource consumption trends as ridership and service levels both declined, resulting in lower absolute energy use, but higher energy use per PMT.

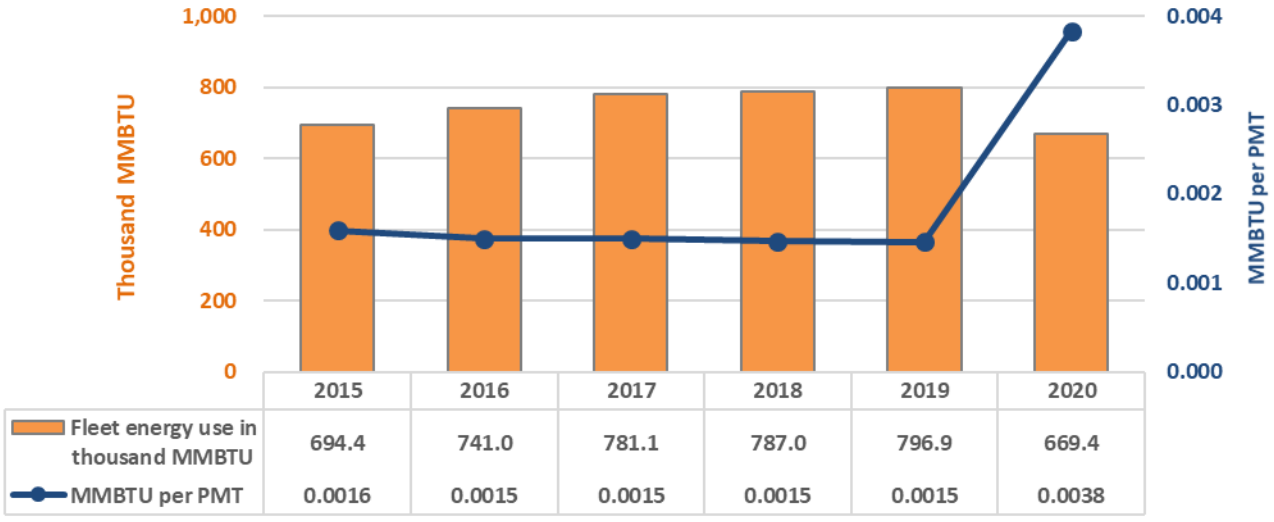
- Traction power electricity use for Link light rail in 2020 grew 130 percent since 2011 but declined 15 percent between 2019 and 2020.
- Diesel fuel use for Sounder commuter rail in 2020 was up 1 percent from 2011 consumption levels and down 22 percent from 2019 levels.

- In March of 2020, Sounder reduced service levels from 34 daily trips to 18 daily trips; service increased in September 2020 to 22 daily trips. Special event service (i.e. for sporting events) was suspended from March through the end of 2020.

- Diesel fuel consumption for ST Express buses in 2020 was down 7 percent from 2011 levels and declined 14 percent from 2019 to 2020.
  - The composition of the ST Express fuel mix has changed over time; compressed natural gas (CNG) used in ST Express buses has increased from 5.7 percent of total ST Express fleet energy consumption in 2011, to 11.8 percent in 2019, to 12.8 percent in 2020. The increase in agency CNG use since 2011 is largely the result of a growing prevalence of CNG buses in the Pierce Transit operated portion of the ST Express fleet.
  - While both diesel and CNG buses saw service cuts in 2020, CNG buses saw only a 7 percent decline in energy consumption from 2019, while diesel buses saw a 15 percent decline.
  - Although using CNG instead of diesel fuel reduces total GHG emissions and most criteria air pollutant emissions, including particulate matter (PM) and NO_x, CNG use does increase carbon monoxide (CO) emissions. (Air pollutants are discussed on pages A12-A16.)

Figure 4 below shows the trend in fleet fuel use over time. Table 2 below shows the percent change in energy use from 2019 to 2020 per mode, as well as the percent change in efficiency (fuel use normalized by PMT for each mode).

Figure 4. Revenue Fleet Energy Use (Normalized by PMT), 2015-2020



	2015	2016	2017	2018	2019	2020
Fleet energy use in thousand MMBTU	694.4	741.0	781.1	787.0	796.9	669.4
MMBTU per PMT	0.0016	0.0015	0.0015	0.0015	0.0015	0.0038

Figure 5. Revenue Fleet Energy Use (Normalized by VRM), 2015-2020

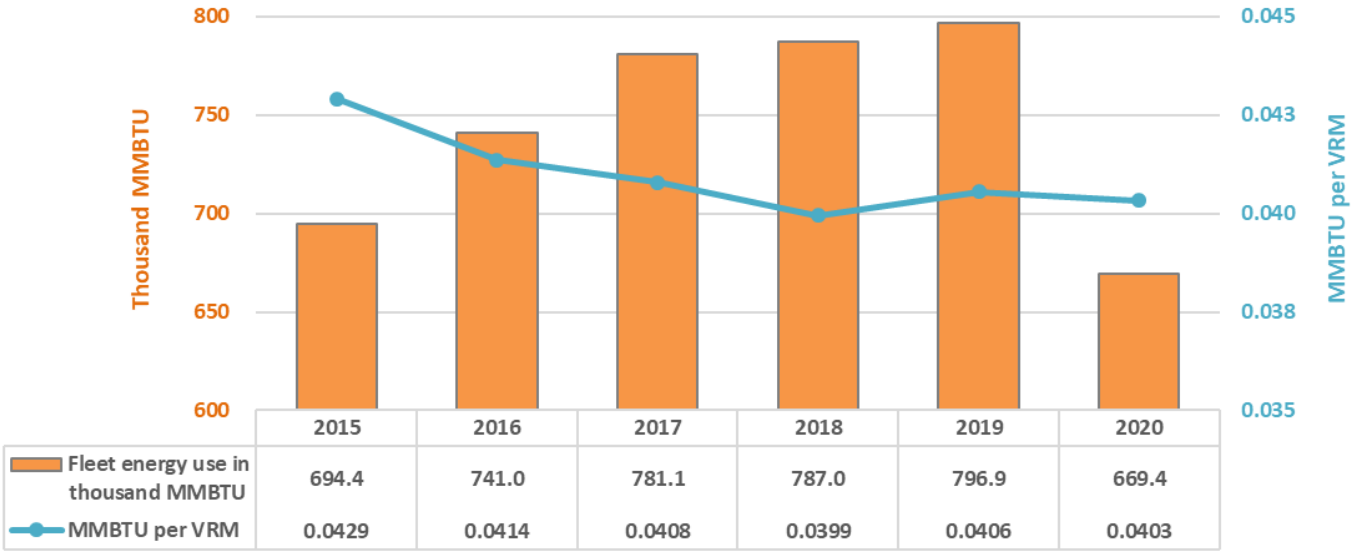


Table 2. Change in Energy Use by Mode, 2019-2020

Mode	% Change in Total Energy Use	% Change in Energy Use per PMT	% Change in Energy Use per VRM
Sounder Commuter Rail (diesel)	-22%	+205%	+12%
ST Express Buses (diesel and CNG)	-14%	+137%	-6%
Link light rail traction power (electricity)	-15%	+178%	+12%

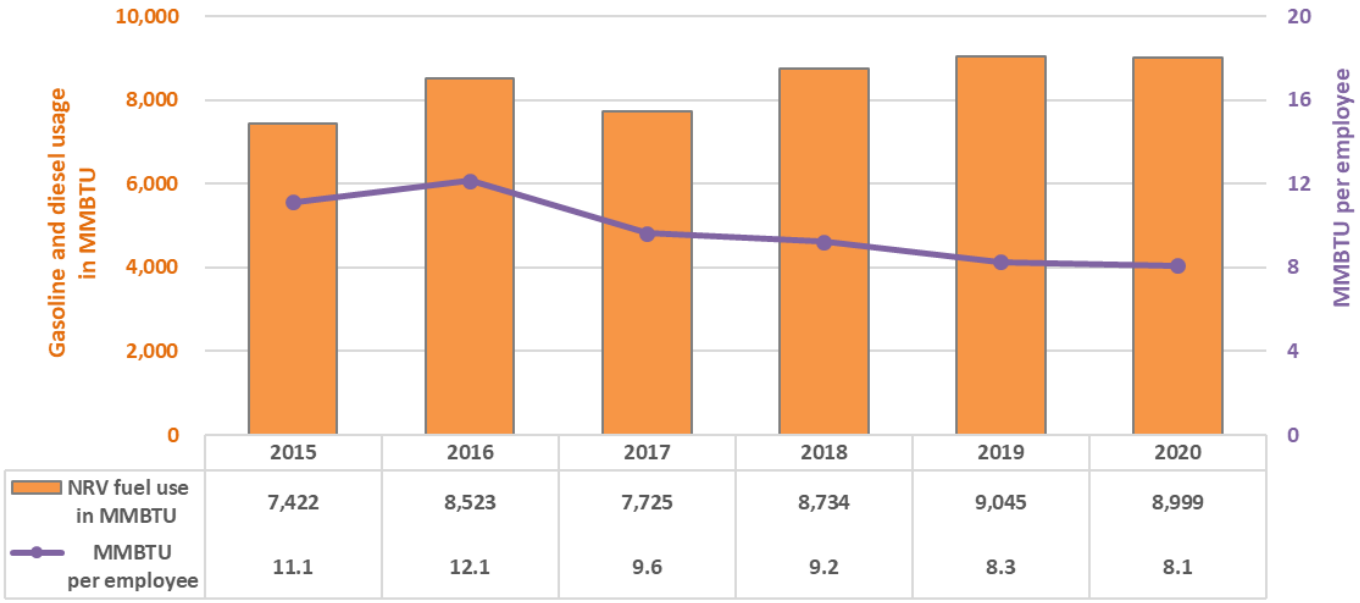
Note: Mode energy use is normalized by PMT and VRM specific to each mode.

Non-Revenue Fleet Energy Use

- Since 2011, non-revenue fleet energy use has increased by 13 percent overall but decreased by 46 percent per employee.
- From 2019 to 2020, non-revenue fleet energy use declined by 1 percent while decreasing by 2 percent per employee.

Energy use for the agency's non-revenue fleet has remained relatively stable over time, with some fluctuations from year to year, as shown in Figure 6. Non-revenue fleet energy use was 13 percent higher in 2020 than in the 2011 baseline year. While the agency's headcount has increased every year, contributing to more driving, Sound Transit has also purchased more hybrid vehicles, helping to reduce per-mile and per-employee energy use and air pollutant emissions. Prior to the Covid-19 pandemic, the agency encouraged employee use of carpooling or transit whenever feasible.

Figure 6. Non-Revenue Fleet Energy Use, 2015-2020



	2015	2016	2017	2018	2019	2020
NRV fuel use in MMBTU	7,422	8,523	7,725	8,734	9,045	8,999
MMBTU per employee	11.1	12.1	9.6	9.2	8.3	8.1

Facility Energy Use

- Total facility energy use was up 20 percent in 2020 from the 2011 baseline.
- From 2019 to 2020, total facility energy use declined by 4 percent.
- Facilities built before 2018 reduced energy consumption relative to a 2018 baseline by 11 percent in 2020*

As the agency has increased its staff and brought additional stations and facilities online, facility energy use has generally increased.Sound Transit notably opened the Capitol Hill, University of Washington, and Angle Lake Link light rail stations in 2016. Further development of the Mukilteo station in 2016, with the addition of a second platform, more elevators, and a new pedestrian bridge, also added to energy loads.

Although many Sound Transit facilities remained operational throughout the COVID-19 pandemic, the bulk of Sound Transit's office staff worked remotely for more than 9 months of the year. As a result, office utility consumption dropped significantly. Additionally, service facilities like Century Yard Operations Building saw less operational activity, using less energy.

From 2019 to 2020, total facility electricity use declined 4 percent but varied substantially by line of business. Although electricity consumption is subject to external factors like weather and the growth of the network, Sound Transit continues to implement facility energy efficiency measures aimed to reduce agency electricity consumption.

Energy use at certain Sound Transit facilities can be partially dependent on weather. However, heating degree days and cooling degree days remained fairly stable from 2019 to 2020 and seem unlikely to have contributed significantly to the decline of energy use observed.

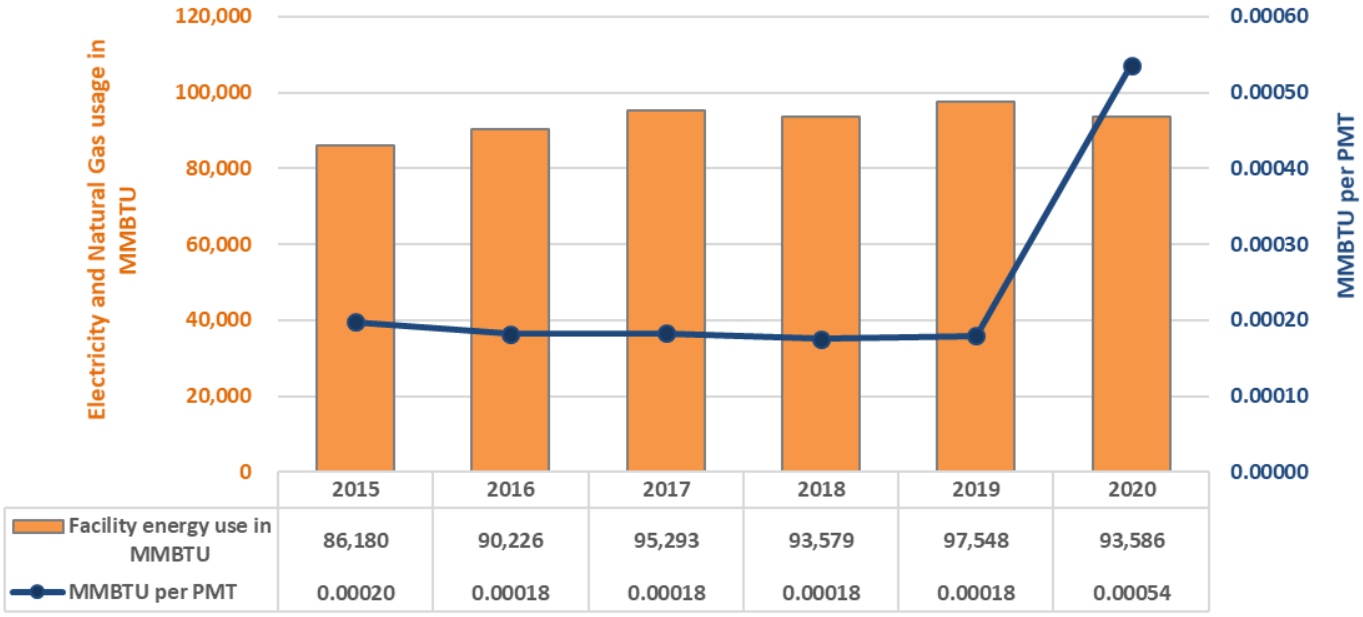
Notable electricity consumption trends include:

- Link light rail facilities increased electricity consumption by 8 percent, largely attributable to increased activity at the Central Link OMF in preparation for upcoming service expansion.

* 2019 Sustainability Plan Key Performance Indicator

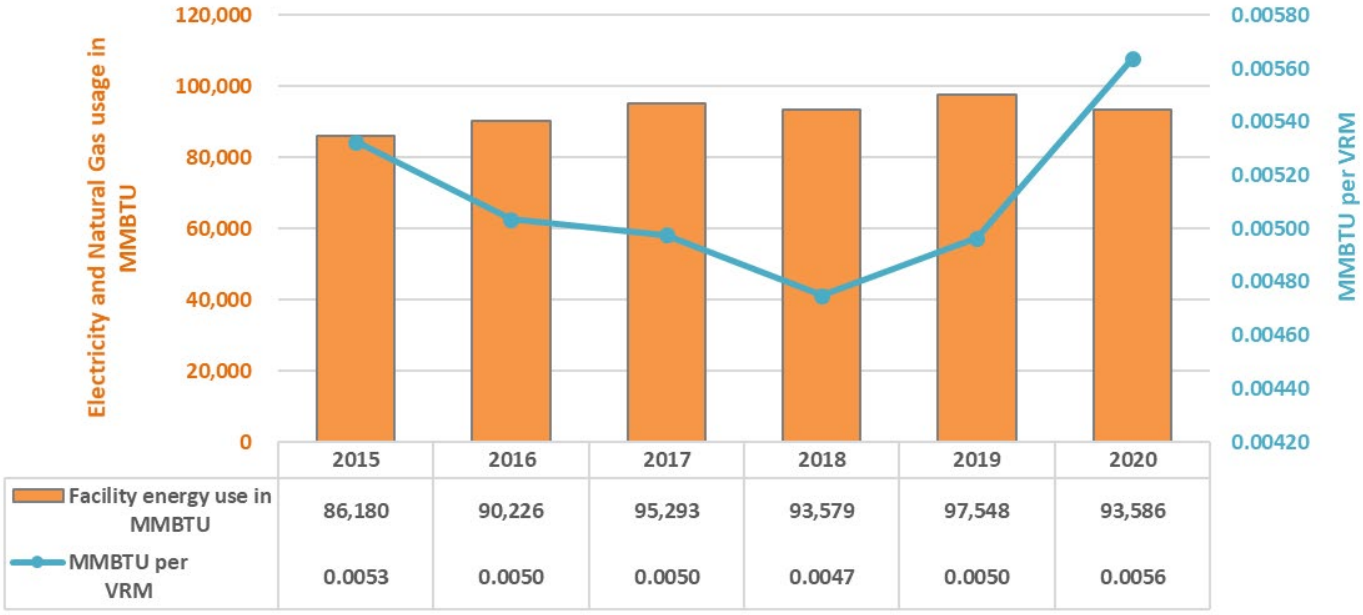
    - Sound Transit received a delivery of new light rail vehicles at Central Link OMF, which subsequently required additional yard traction power.
    - Reduced Link service during 2020 meant that more light rail vehicles were in the yard consuming standby power.
    - The main building increased rates of outdoor air intake in HVAC operations as a measure to counter COVID-19 risks indoors.
- Sounder facilities reduced electricity consumption by 26 percent, due in large part to reduced service leading to reduced wayside power usage for Sounder trains idling in the terminus stations.
- Across both owned and leased properties, Sound Transit administrative facilities decreased electricity consumption in 2020 by 7 percent.
- ST Express facilities decreased electricity consumption by 8 percent.

Figure 7. Facility Energy Use (Normalized by PMT), 2015-2020



	2015	2016	2017	2018	2019	2020
Facility energy use in MMBTU	86,180	90,226	95,293	93,579	97,548	93,586
MMBTU per PMT	0.00020	0.00018	0.00018	0.00018	0.00018	0.00054

Figure 8. Facility Energy Use (Normalized by VRM), 2015-2020

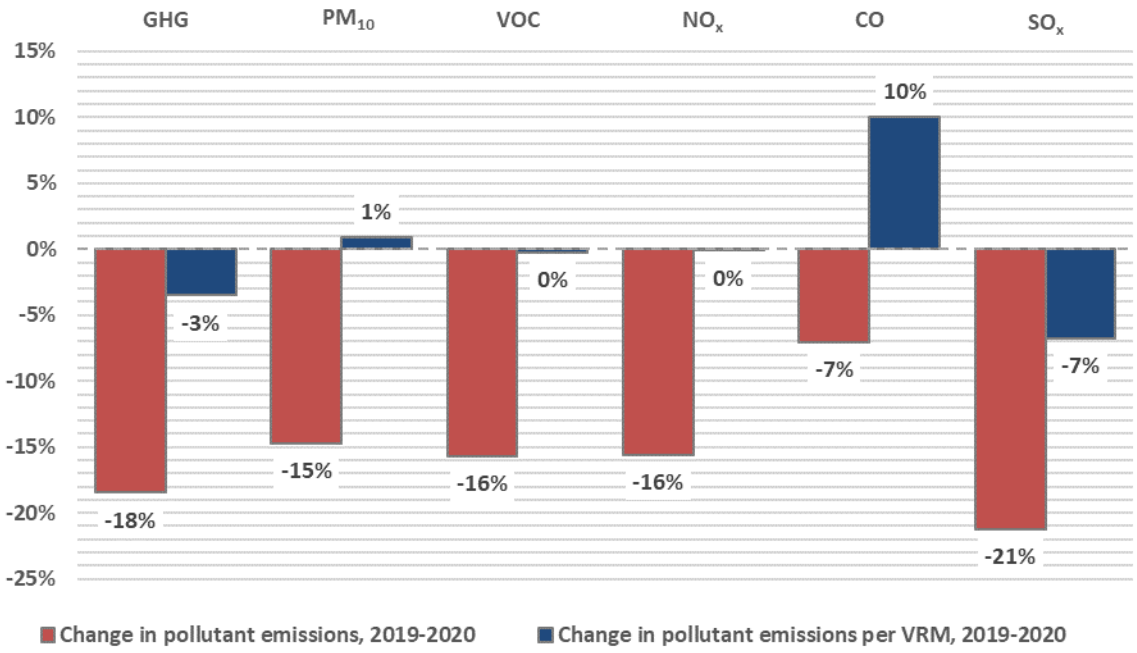


	2015	2016	2017	2018	2019	2020
Facility energy use in MMBTU	86,180	90,226	95,293	93,579	97,548	93,586
MMBTU per VRM	0.0053	0.0050	0.0050	0.0047	0.0050	0.0056

Air Pollutant Emissions

The sections below illustrate the trends in GHG emissions and criteria air pollutant emissions from Sound Transit vehicle and facility operations. Figure 9 below shows the total percent change and the change normalized per vehicle revenue mile by pollutant type from 2019 to 2020. As noted above, agency VRM decreased by 16 percent from 2019 to 2020.

Figure 9. Changes in Pollutant Emissions, 2019-2020; Change in Pollutant Emissions per VRM, 2019-2020



Greenhouse Gas Emissions

- Relative to the 2011 baseline, agency greenhouse gas (GHG) emissions are down 18 percent in 2020.
- From 2019 to 2020, agency GHG emissions decreased by 18 percent.
- Relative to 2018, agency GHG emissions are down 26 percent in 2020.*

As Sound Transit service and ridership increased from 2011 to 2019, agency GHG emissions in metric tons CO2 equivalent (MTCO2e) remained relatively stable in absolute terms and had been declining on a normalized basis. There were multiple factors that resulted in a drop in total agency GHG emissions and a spike in GHG emissions per PMT in 2020, as pictured in Figure 10:

- First, 2020 marked Sound Transit's first full year of enrollment in the PSE Green Direct program to provide 100% renewable electricity to all PSE accounts serving the Central Link Light Rail line (initial enrollment began in July 2019) GHG emissions from traction power declined 7 percent from 2019 to 2020.

* 2019 Sustainability Plan Key Performance Indicator

- Second, a reduction in service levels directly reduced the amount of diesel fuel consumed for ST Express and Sounder commuter rail; as shown in **Figure 12**, the majority of agency GHG emissions are attributable to the combustion of diesel fuel for ST Express and Sounder.

Figure 10. Agency GHG Emissions (Normalized by PMT), 2015-2020

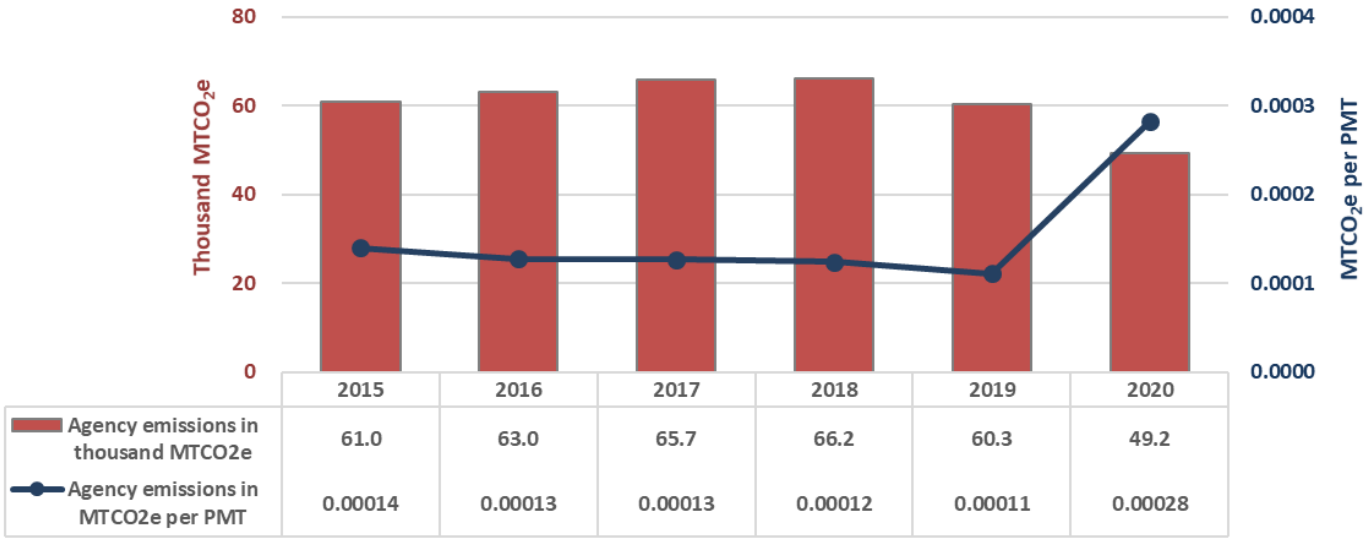


Figure 11. Agency GHG Emissions (Normalized by VRM), 2015-2020

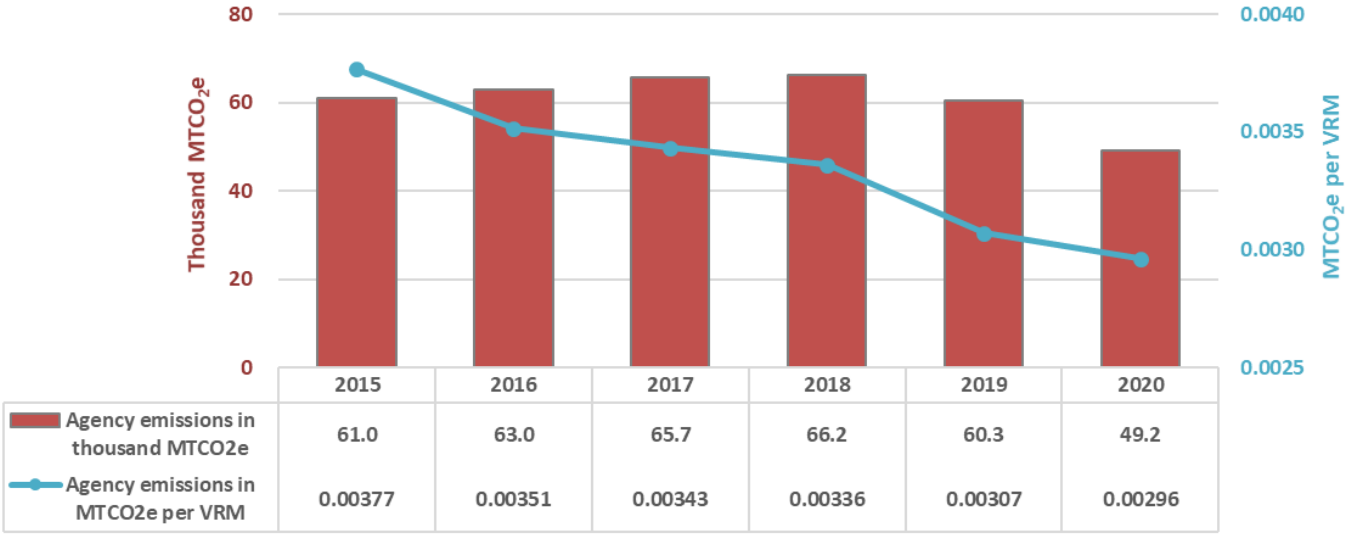
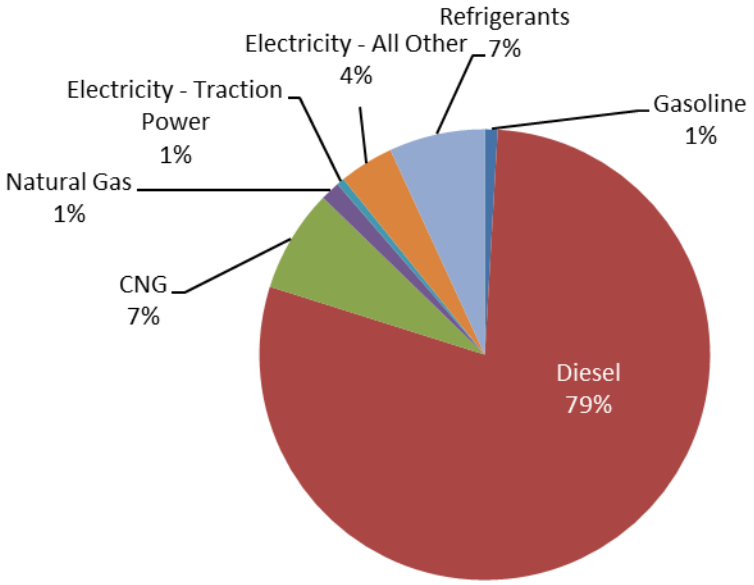


Figure 12. Greenhouse Gas Emissions by Energy Source, 2020



Criteria Air Pollutants

Table 3. Change in Criteria Air Pollutant Emissions

Pollutant	Change 2011-2020 (Absolute)	Change 2019-2020 (Absolute)
PM_{10}	-65%	-15%
VOCs	-69%	-16%
NO_X	-47%	-16%
CO	-75%	-7%
SO_X	-1%	-21%

- Due to decreased service levels and reduced fuel consumption, 2020 saw absolute reductions across all Criteria Air Pollutant (CAP) emissions from the prior year.
- Sound Transit's CAP emissions - particulate matter (PM10), volatile organic compounds (VOCs), nitrogen oxides (NOx), carbon monoxide (CO), and sulfur oxides (SOx) – have mostly declined over the past several years.

Sound Transit's long-term reduction in CAP emissions has been driven in part by ST Express's gradual shift from reliance on diesel buses to diesel-electric hybrids and CNG buses, as well as general improvements in emission controls. The agency has also upgraded all Sounder commuter rail engines to reduce air pollution.

The figures below show the absolute and normalized change in PM_{10} and CO emissions since 2015. These criteria air pollutants are down 65 percent and 75 percent since 2011, respectively. While all CAP emissions decreased from

2019 to 2020, CO emissions decreased less than any other CAP, due to a higher proportion of ST Express routes run with CNG buses, which characteristically emit greater volumes of CO. The noticeable drop in CO emissions starting in 2016 is primarily due to phasing out model year 2001 CNG buses.

Figure 13. Particulate Matter (PM_{10}) Emissions (Normalized by PMT), 2015-2020

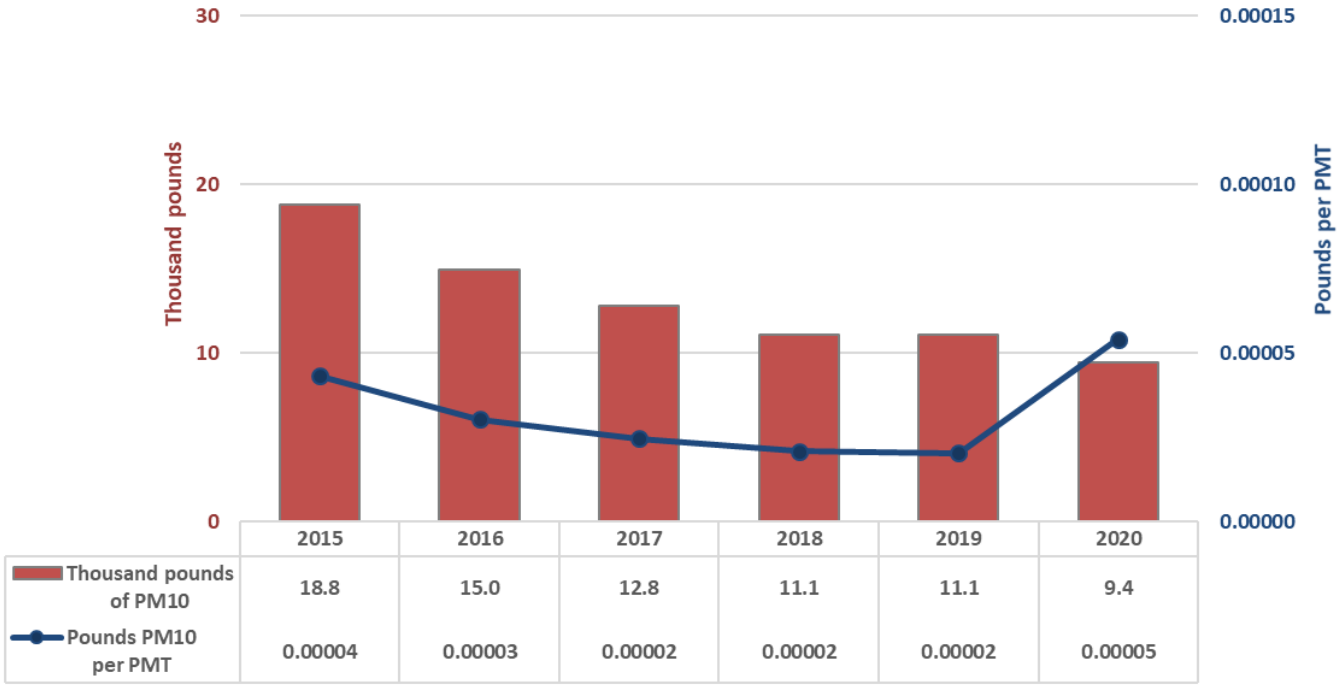


Figure 14. Particulate Matter (PM_{10}) Emissions (Normalized by VRM), 2015-2020

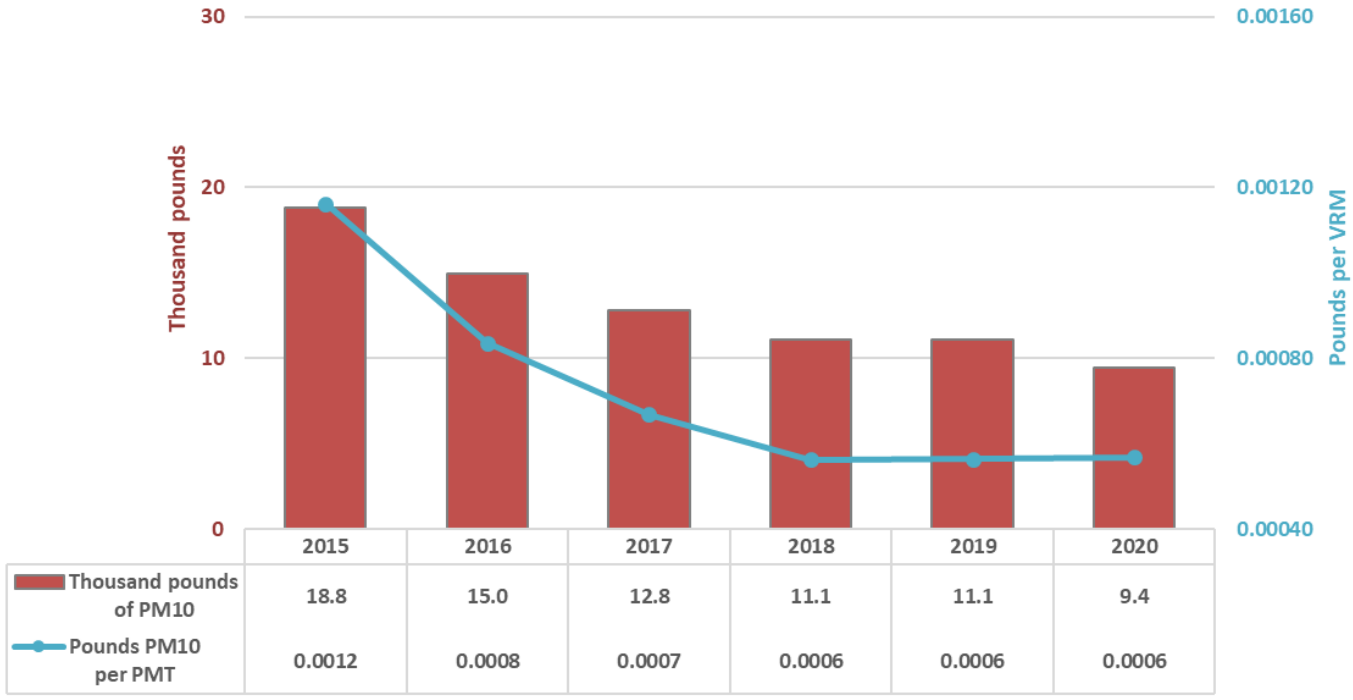


Figure 15. Carbon Monoxide (CO) Emissions (Normalized by PMT), 2015-2020

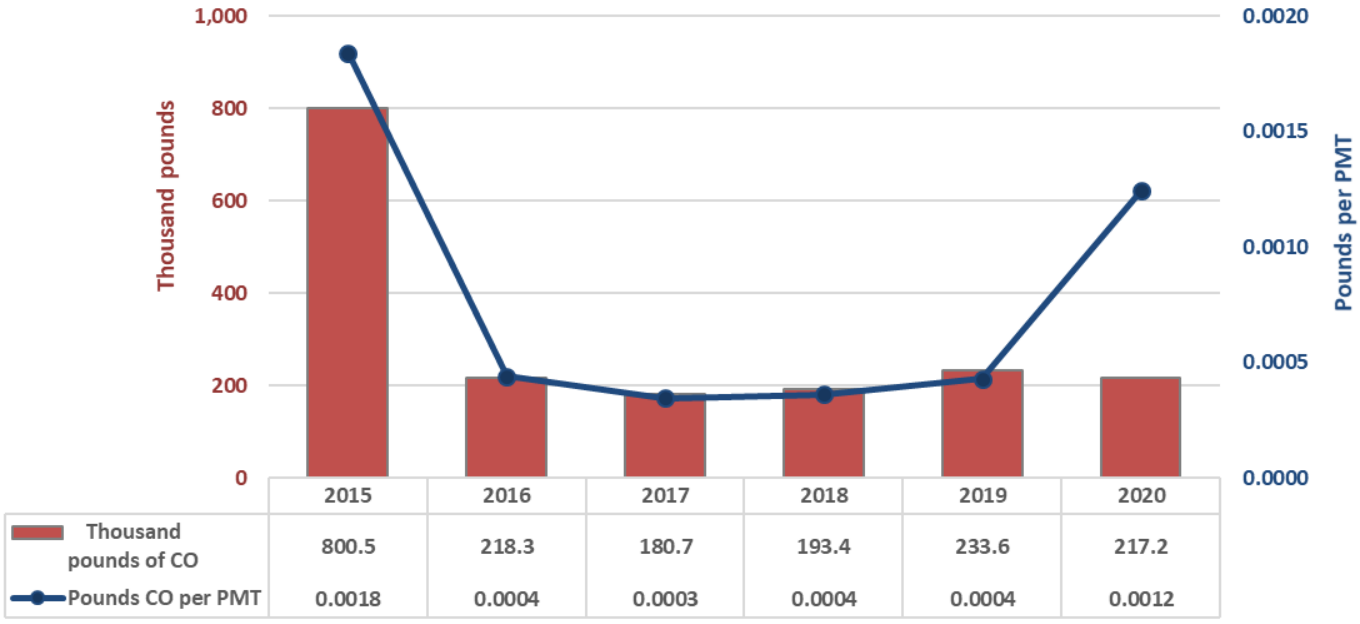
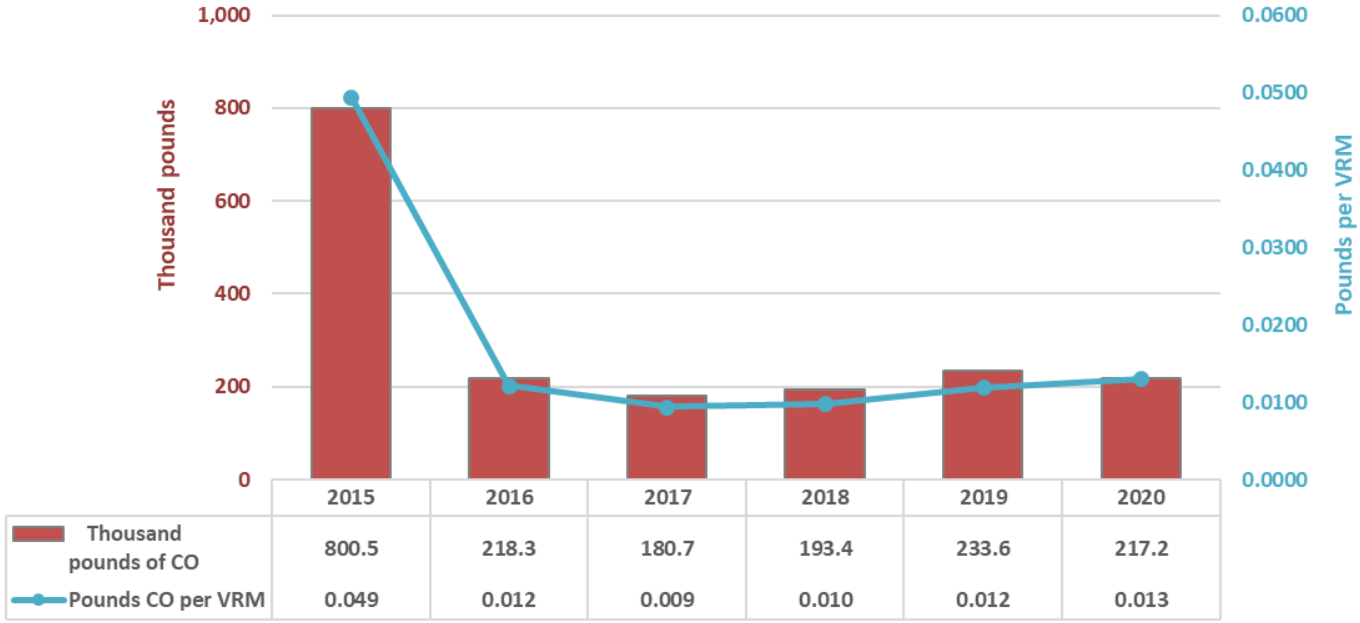


Figure 16. Carbon Monoxide (CO) Emissions (Normalized by VRM), 2015-2020

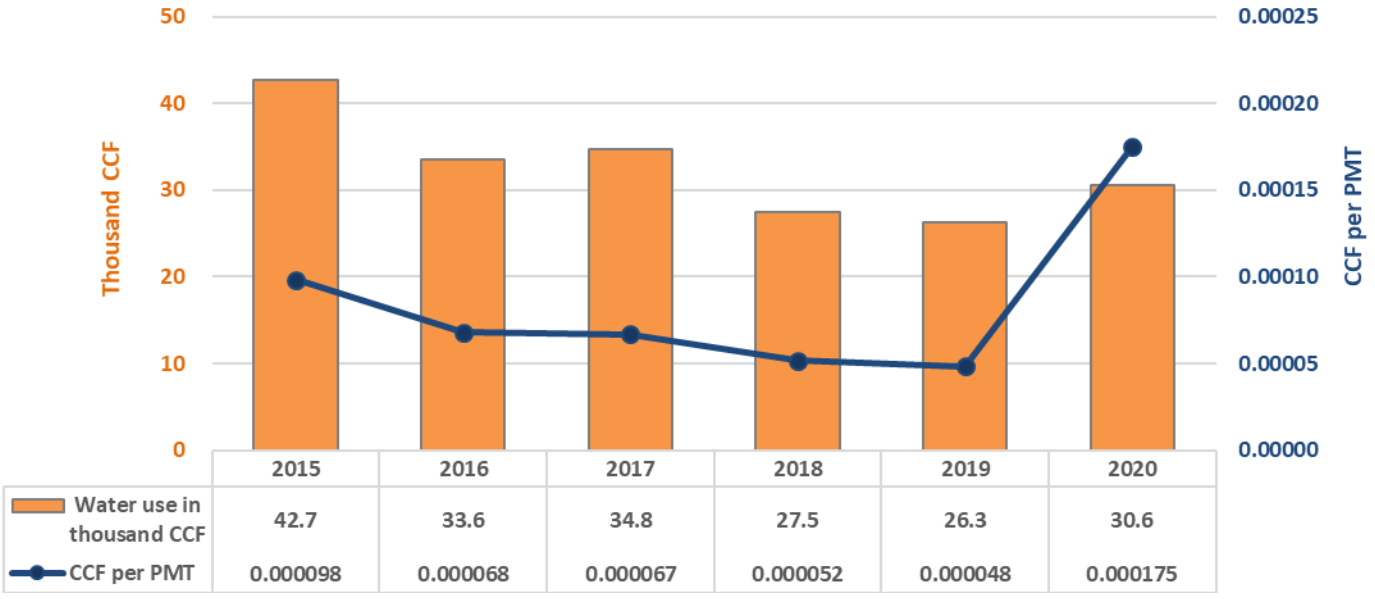


Water Use

- Since 2010, water use has grown by 19 percent in total.
- From 2019 to 2020, water use increase by 17 percent in total.

- Total agency water use is primarily driven by landscape irrigation and is therefore variable from year to year, depending on both weather and leak incidents. Irrigation-related leak incidents drove much of the additional water consumption observed in 2020.
- Changes in agency water consumption from the prior year varied across agency functions in 2020. Maintenance facilities increased water consumption 12 percent from the prior year, customer facilities increased consumption 33 percent and administrative facilities reduced water consumption 55 percent.

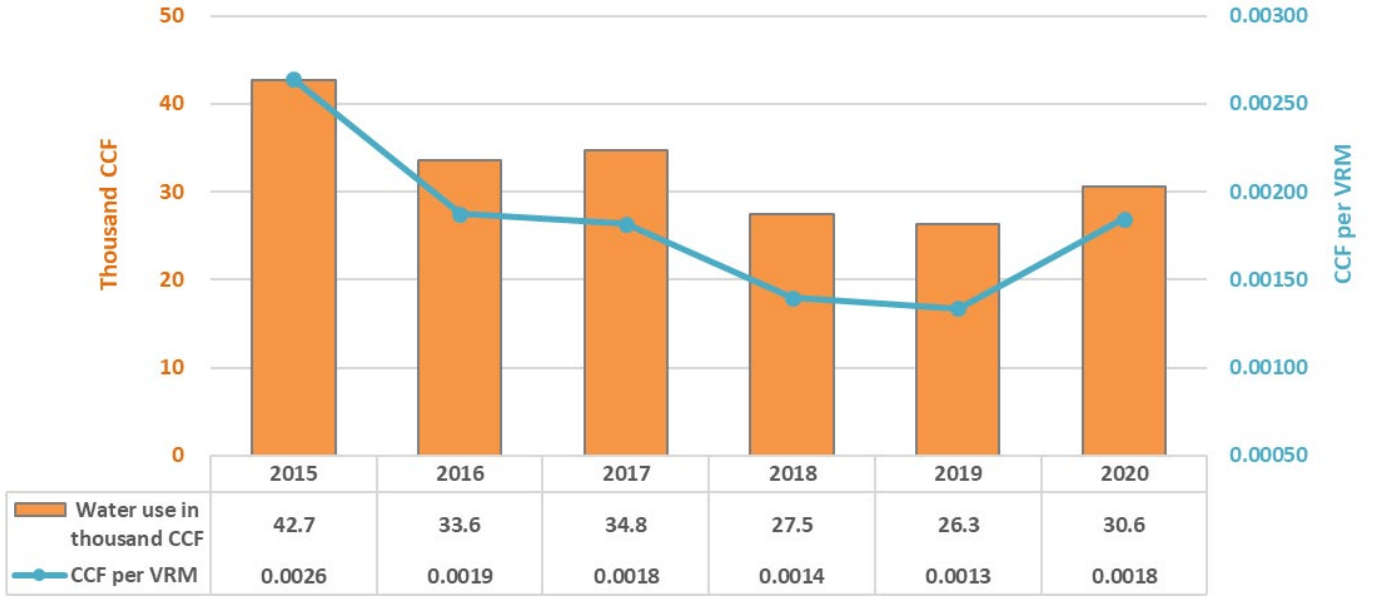
Figure 17. Water Use (Normalized by PMT), 2015-2020



	2015	2016	2017	2018	2019	2020
Water use in thousand CCF	42.7	33.6	34.8	27.5	26.3	30.6
CCF per PMT	0.000098	0.000068	0.000067	0.000052	0.000048	0.000175

Note: 1 CCF equals 100 cubic feet, or 748 gallons

Figure 18. Water Use (Normalized by VRM), 2015-2020



	2015	2016	2017	2018	2019	2020
Water use in thousand CCF	42.7	33.6	34.8	27.5	26.3	30.6
CCF per VRM	0.0026	0.0019	0.0018	0.0014	0.0013	0.0018

Waste Generation

- Since 2010, waste generation has declined by 21 percent.
- From 2019 to 2020, waste generation decreased 3 percent.

While acknowledging substantial inter-annual variability, waste generation at Sound Transit facilities has declined 21 percent since 2010 as service and agency staff have increased. The total amount of garbage sent to landfill has declined 25 percent over the same timeframe, while the rate at which recyclables and compost have been diverted from the landfill has hovered between a low of 27 percent (2010) and a high of 39 percent (2014), achieving a diversion rate of 31 percent in 2020.

Since 2010, the agency has worked to improve solid waste diversion from landfill by enhancing employee recycling education and implementing paper towel composting in the restrooms at Union Station. In 2016, the disposal bins at the Central Link OMF facility were too small for the volume of garbage, leading to co-mingling of solid waste and recyclables, until bins were upgraded. This problem underscores the importance of ongoing assessment and education, as well as appropriate infrastructure, to support recycling and composting efforts. The COVID-19 pandemic resulted in a shift of the administrative staff in 2020 to remote work, which in turn decreased office recycling and composting volumes as a component of the total agency waste stream.

- From 2019 to 2020, waste generation increased by 5 percent, in spite of the administrative staff moving to remote working in 2020 and only a minor increase in agency headcount. Staff are working to better understand the source of this increase.
- Composting quantities in 2020 decreased 15 percent from the prior year, while recycling quantities decreased 21 percent. The agency's total diversion rate during that period decreased from 36 to 31 percent, as pictured in Figure 19 below.
- Waste diversion rates for central office facilities are substantially higher than for other facilities. As depicted in Table 4 below, the diversion rate from landfill for central office facilities remained in the 60-64% range prior to the COVID-19 pandemic but sank to 50% with the move of the administrative staff to remote working.

Figure 19. Waste Generation and Diversion, 2015-2020

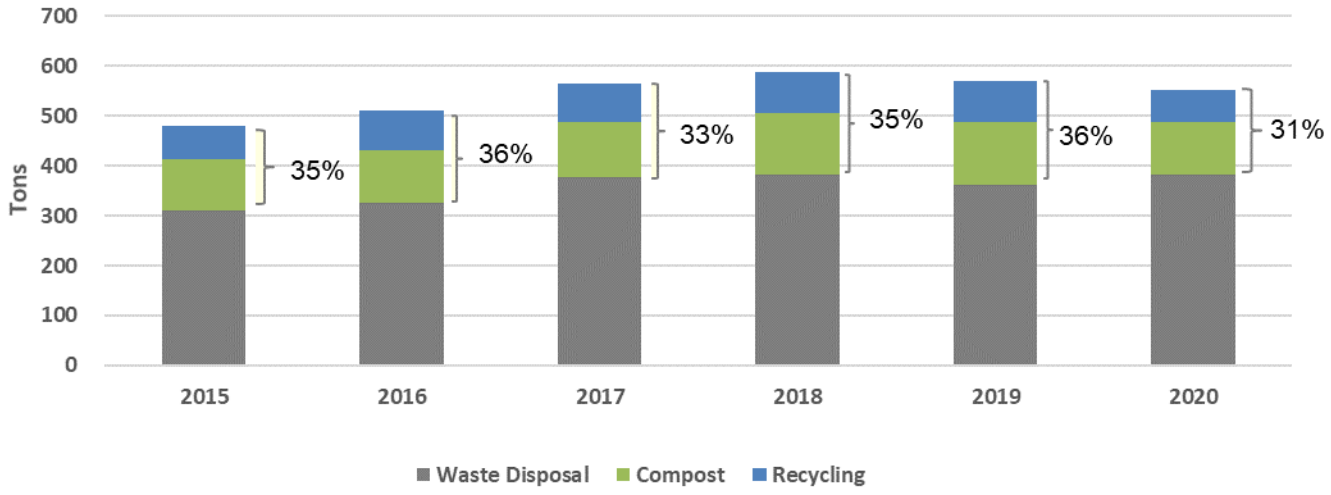


Table 4. Waste Diversion Rates by Facility Type

Year	Central Office	Other Facilities	Total
2015	64%	25%	35%
2016	66%	24%	36%
2017	61%	22%	33%
2018	60%	23%	35%
2019	61%	24%	36%
2020	50%	24%	31%

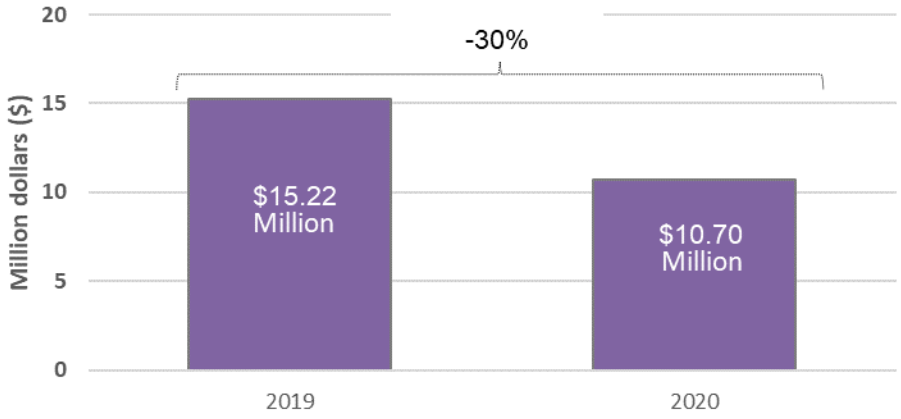
Fuel and Utility Expenses

- Relative to 2010 levels, fuel costs for ST Express buses and Sounder commuter rail are down 43 percent.
- From 2019 to 2020, fuel costs decreased by 43 percent.
- Since 2010, utility costs have increased by 122 percent.
- From 2019 to 2020, utility costs decreased by 4 percent.

Resource costs across categories have generally trended upward since 2010. However, the COVID-19 pandemic in 2020 resulted in a substantial decrease in revenue vehicle fuel expenses and a more modest decline in facility resource expenditures. Figure 20 below shows the change in agency operating costs for fuel and utilities from 2019 to 2020. Vehicle revenue miles decreased by 16 percent in this period.

As figures 20 and 21 indicate, fuel and utility costs increase and decrease track closely with services levels as measured by VRM.

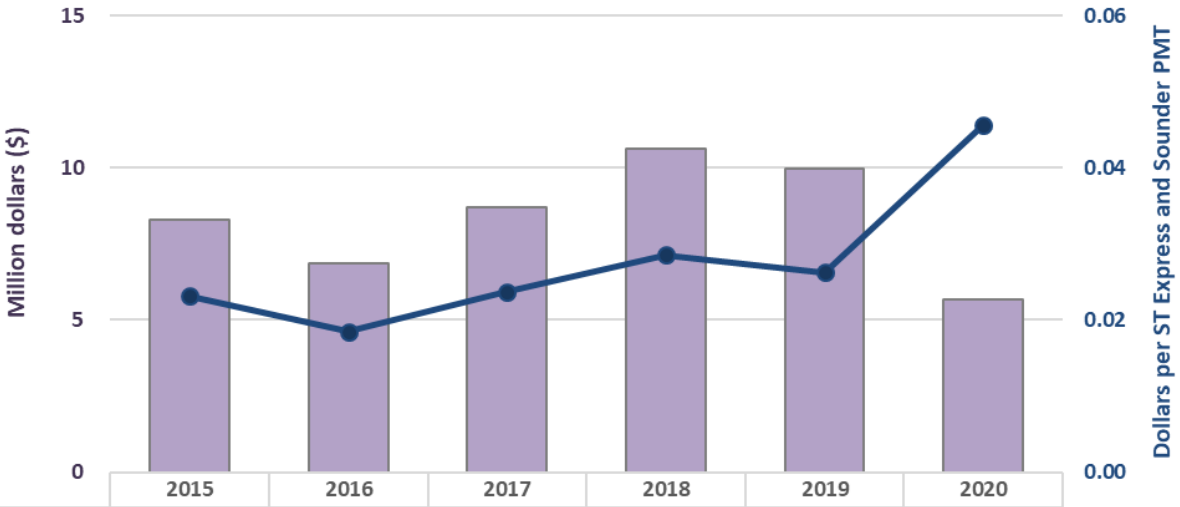
Figure 20. Fuel and Utility Expenses



Fuel Costs

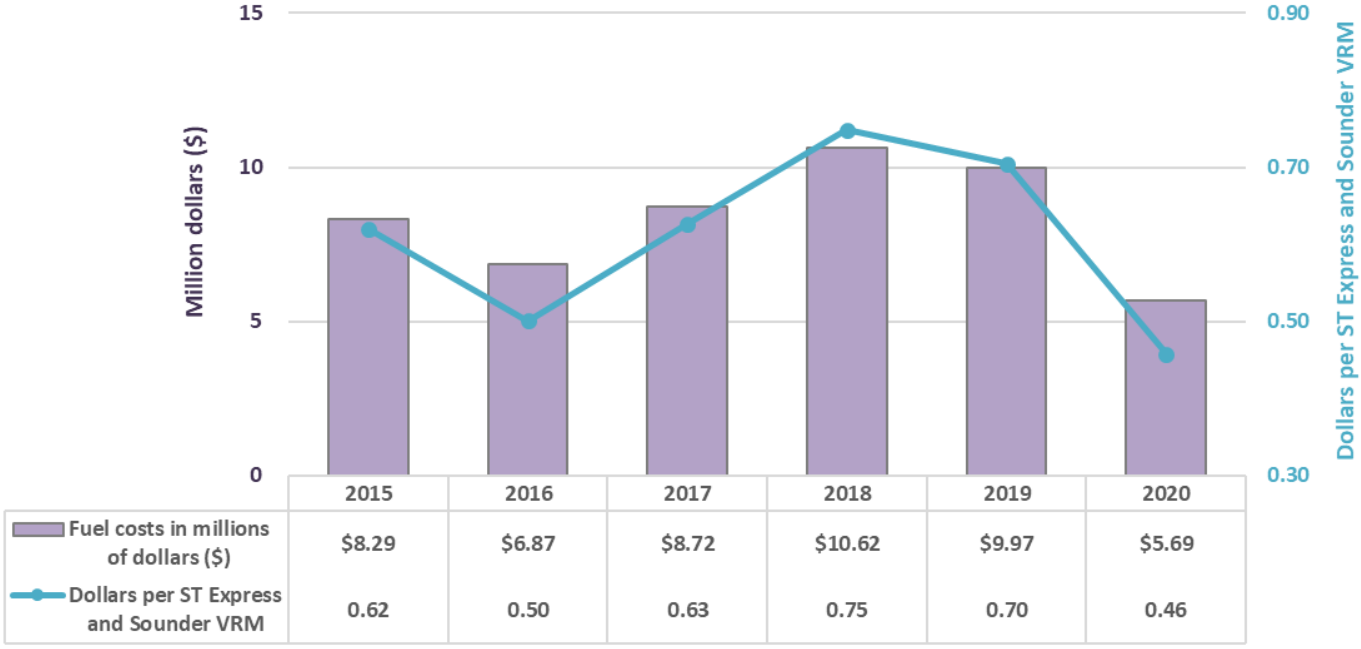
- Fuel costs for ST Express buses and Sounder commuter rail have decreased by 43 percent since 2010 and by 43 percent from 2019 to 2020.
- Transit vehicle fuel use accounted for 53 percent of Sound Transit's fuel and utility expenses in 2020, down from 66 percent in 2019.
- In 2020, transit vehicle fuel expenses accounted for 1.5 percent of Sound Transit's operating budget, down from 3 percent the prior year.
- Fuel expenses may have additionally been suppressed by lower fuel costs in the pandemic economy.

Figure 21. Sounder and ST Express Fuel Costs (Normalized by PMT), 2015-2020



	2015	2016	2017	2018	2019	2020
Fuel costs in millions of dollars ($)	$8.29	$6.87	$8.72	$10.62	$9.97	$5.69
Dollars per ST Express and Sounder PMT	0.023	0.019	0.024	0.029	0.026	0.046

Figure 22. Sounder and ST Express Fuel Costs (Normalized by VRM), 2015-2020



	2015	2016	2017	2018	2019	2020
Fuel costs in millions of dollars ($)	$8.29	$6.87	$8.72	$10.62	$9.97	$5.69
Dollars per ST Express and Sounder VRM	0.62	0.50	0.63	0.75	0.70	0.46

Other Utility Expenses

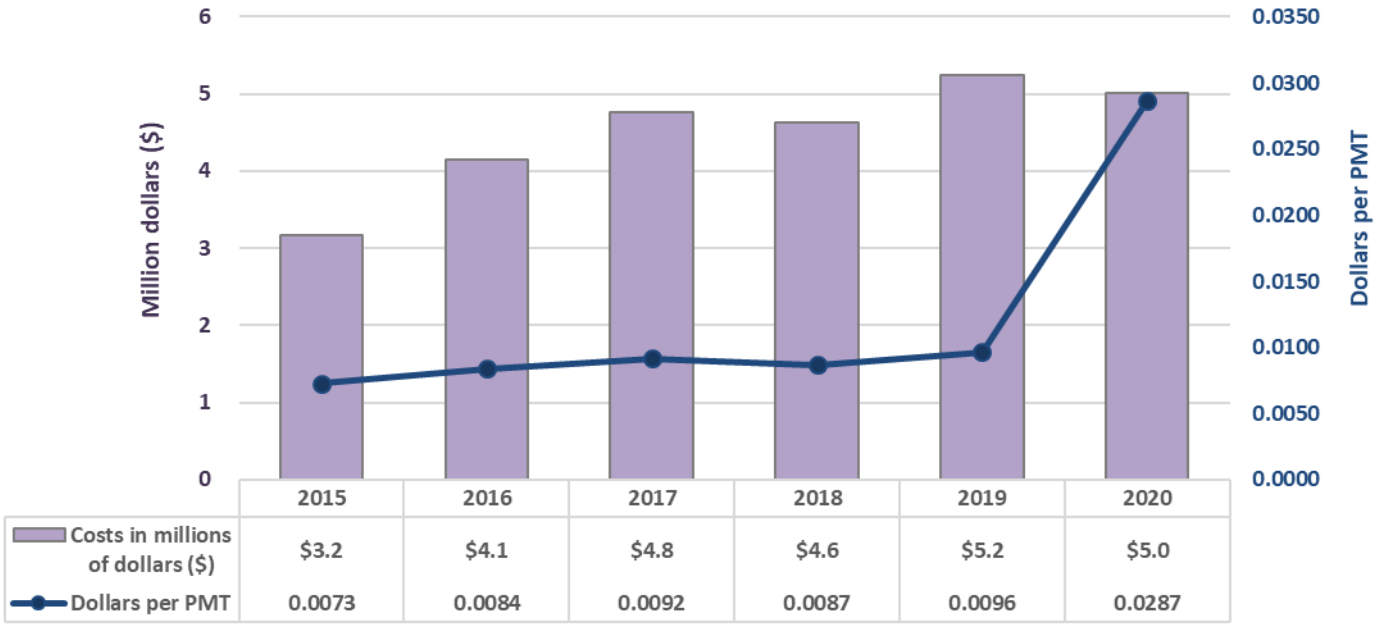
- Since 2010, utility costs have increased by 122 percent and decreased by 4 percent from 2019 to 2020.

Table 5. Change in Utility Costs

	Change 2010-2020 (Absolute)	Change 2019-2020 (Absolute)
Traction power electricity costs	+191%	-11%
Facility electricity costs	+87%	+4%
Facility natural gas costs	+78%	+10%
Water costs	+10%	+14%
Waste, recycling, and compost cost	-6%	+110%

Utility expenses for electricity, water, and waste have increased over time in line with usage trends. Figure 22 below shows the change in resource costs since 2015. Total facility electricity costs since 2010 have increased by 87 percent and waste costs have increased by 110 percent. Water costs have increased by 10 percent during that period but experience inter-annual volatility. The agency's fuel expenses have fluctuated with the volatility in petroleum prices, while other resource costs have increased more steadily.

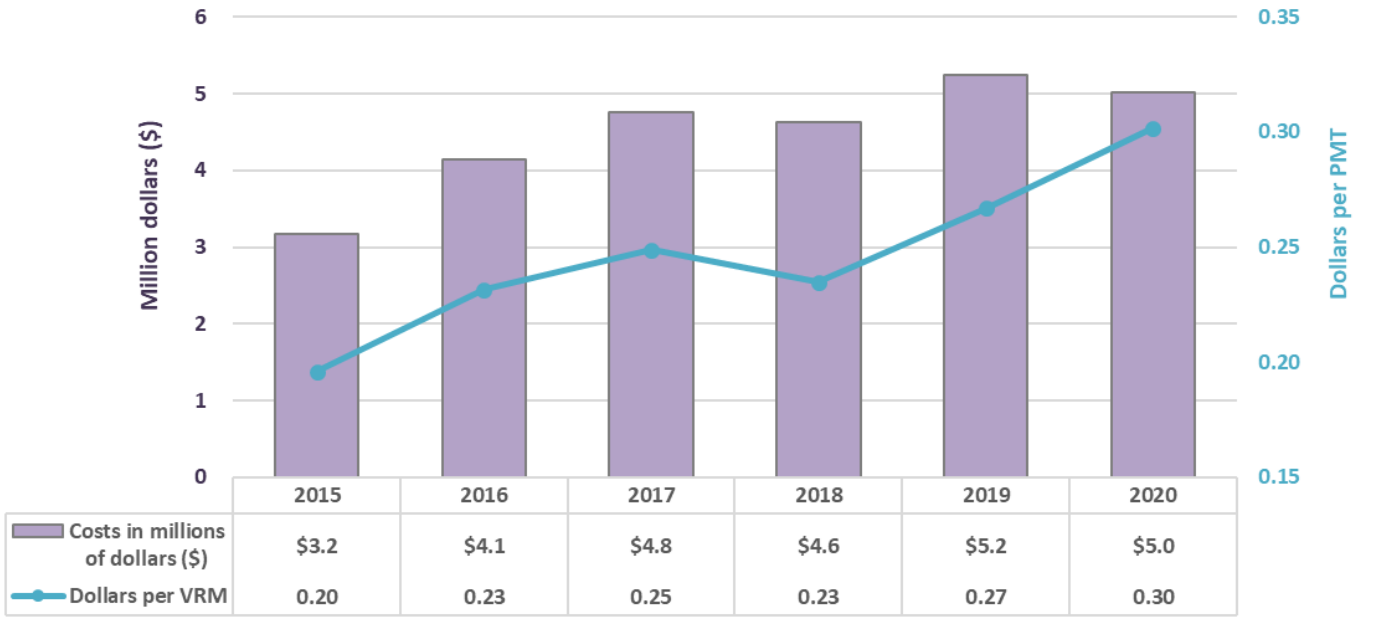
Figure 23. Non-Vehicle Utility Costs (Normalized by PMT), 2015-2020



	2015	2016	2017	2018	2019	2020
Costs in millions of dollars ($)	$3.2	$4.1	$4.8	$4.6	$5.2	$5.0
Dollars per PMT	0.0073	0.0084	0.0092	0.0087	0.0096	0.0287

Note: Stormwater and sewer costs are not included.

Figure 24. Non-Vehicle Utility Costs (Normalized by VRM), 2015-2020



	2015	2016	2017	2018	2019	2020
Costs in millions of dollars ($)	$3.2	$4.1	$4.8	$4.6	$5.2	$5.0
Dollars per VRM	0.20	0.23	0.25	0.23	0.27	0.30

Appendix B – 2020 Sustainability costs and savings

The table below summarizes a sample of costs and savings from resource conservation projects completed as of the end of 2020. This data captures many significant monetary costs and savings. However, projects may have additional sustainability benefits that cannot be represented as financial savings – from reduced maintenance cycles to improved air quality.

Note that the savings figures below do not include labor and material cost savings related to improved operations and maintenance efficiency. Payback year estimates do reflect applicable grants and or rebates. Many projects with long payback periods still incur significant labor and material cost savings and reduce the frequency of maintenance.

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2020 SAVINGS	SAVINGS TO DATE, 2020	PAY-BACK YEAR	DESCRIPTION
ST Express mid-day bus storage	2008	$0	$39,898	$2,054,957	2008	This program allows Pierce County buses to stay in Seattle until the afternoon commute to avoid driving back and forth empty.
Sounder Automatic Engine Start-Stop System	2009	$230,596	$136,170	$1,072,726	2013	This equipment was installed to shut down Sounder commuter rail engines when not in use, and reduces engine idling time by about 34 percent and significantly reduces air pollution.
Sounder Lakewood-Seattle wayside power	2010	$490,000	$42,814	$1,015,175	2015	Electric wayside power units are used instead of the commuter rail locomotives' diesel engines to heat and power coach cars during layover, reducing diesel use and air pollutant emissions. Wayside units were installed in Tacoma in 2010 and were then moved to Lakewood in 2013, where more units were added.
Sounder Everett-Seattle wayside power	2011	$315,000	$5,272	$250,331	2019	
Central Link OMF sewer deduct meter	2012	$2,600	$41,845	$273,747	2012	This Central Link light rail Operations and Maintenance Facility meter reduces water costs by accounting for irrigation water that does not enter the wastewater stream.
Union Station HVAC Controls Upgrade*	2013	$405,778	$25,581	$179,211	2022	The agency upgraded the controls for the Union Station Heating, Ventilation and Cooling (HVAC) system.
Federal Way Transit Center garage lighting upgrades*	2013	$579,334	$32,436	$227,227	2023	Three transit facility garages were retrofitted for LED lighting. These locations included Federal Way Transit Center, Kent Sounder station and Auburn Sounder station.

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2020 SAVINGS	SAVINGS TO DATE, 2020	PAY-BACK YEAR	DESCRIPTION
Kent Station garage lighting upgrades*	2013	$99,773	$5,766	$40,396	2022	
Auburn Station garage lighting upgrades*	2013	$208,985	$11,533	$80,792	2023	
Angle Lake Station Solar Power	2016	N/A – Installed as part of Design Build project	$1,396	$6,248	N/A	14 KW solar array system on the Angle Lake Station platform canopy and 50 KW solar array system on the Angle Lake Garage pedestrian walkway. These solar panels were installed in the original design build contract for the facility.
Angle Lake Garage Solar Power	2016		$1,850	$16,182	N/A	
Kent Station lighting upgrades*	2017	$169,849	$10,210	$38,406	2030	Kent, Sumner and Puyallup Stations were upgraded with LED lighting.
Sumner Station lighting upgrades*	2017	$138,967	$10,250	$38,557	2027	
Puyallup Station lighting upgrades*	2017	$169,849	$10,622	$39,956	2029	
OMF Interior and Exterior LED Lighting and EMS Controls Upgrade*	2018	$1,065,415	$70,944	$198,643	2026	The building control system was upgraded at the Operations and Maintenance Facility, which allows for improved building mechanical operations. The inefficient lighting was replaced with LED in the maintenance shop and exterior parking areas.
Mukilteo Parking Lot lighting upgrade	2018	$13,150	$3,558	$9,212	2021	Parking lot lighting was retrofitted with LED lights near Mukilteo Station.
Issaquah Transit Center lighting upgrade*	2018	$161,514	$8,921	$22,999	2035	Lighting was upgraded to LEDs at the Issaquah Transit Center, Mercer Island Park & Ride, and King St. Stations from parking garages and station platforms to area lighting.
Mercer Island Park and Ride Lighting Upgrade*	2018	$191,424	$8,402	$21,408	2038	
King St. Station Lighting Upgrade*	2018	$245,262	$4,966	$9,946	2066	

PROJECT	PROJECT FINISHED	CAPITAL COSTS	2020 SAVINGS	SAVINGS TO DATE, 2020	PAY-BACK YEAR	DESCRIPTION
Sounder Yard Solar	2018	N/A - Installed as part of Design Build project	$204	$593	N/A	2.1 KW solar array system on the Sounder Yard facility. These solar panels were installed in the original design build contract for the facility.
Light Rail Vehicles Lighting Upgrade	2019	$137,022	$18,782	$30,952	2024	Interior lighting and headlights on Link Light Rail were upgraded to LED, which reduced lighting energy use by 45%. The project also improved visibility and reduced maintenance requirements for the lighting system.
Light Rail Vehicles Oil-less Compressors	2019	$650,100	$14,069	$50,903	2039	Compressors on 62 Link Light Rail vehicles were upgraded with oil-less compressors as part of their lifecycle replacement. The new compressors do not use any oil, reduce maintenance costs and improve reliability.
Edmonds Station Parking Lot Lighting Upgrade	2019	$7,620	$1,577	$2,635	2022	Facilities retrofitted (24) 250 watt metal halide parking lot lights with 100 watt LED lights. The new lights use 60% less energy and require significantly less maintenance.
Angle Lake Garage Irrigation Controls	2020	$1,903	$161	$161	2029	Installed smart irrigation controls at four locations.
Everett Sounder Station Irrigation Controls	2020	$2,562	$304	$304	2026	
Issaquah Transit Center Irrigation Controls	2020	$2,642	$433	$433	2022	
Mercer Island Park and Ride Irrigation Controls	2020	$7,363	$324	$324	2026	
Lynnwood Warehouse LED Lighting	2020	$52,606	$160	$160	2028	Replaced interior and exterior linear fluorescent and metal halide lighting with LED.

* Cost savings figures for projects implemented through an Energy Performance Contract (denoted with an *) represent average, annualized savings based on the project's projected lifetime savings. These projects may ultimately achieve energy and cost savings in excess of the guaranteed amount.

Appendix C – 2020 Key Performance Indicators

The table below presents the Key Performance Indicators (KPIs), as defined in the 2019 Sustainability Plan. The table also shows the KPIs in relation to their associated Priorities, Long-term goals and Short-term goals, per the Sustainability Plan. The KPIs reflect current progress compared to the 2019 Sustainability Plan's baseline year of 2018. Note that the KPIs below are a subset of the 2019 Sustainability Plan's metrics.

PRIORITY	LONG-TERM GOALS	APPLICABLE SHORT-TERM GOALS	KEY PERFORANCE INDICATOR	2018 BASELINE VALUE	2020 VALUE AND/OR PERCENT CHANGE
People	Social equity addressed and implemented as an agency value	Contribute to a revolving loan fund for affordable housing revolving loan fund	# of dollars contributed to affordable housing revolving loan fund	Contributions began in 2019	$4 million
		Build staff awareness and capacity to integrate equity into all business lines	% of staff trained in equity and inclusion	37% of staff trained	• 93% of staff completed Equal Employment Opportunity (EEO) Training • 52% of staff completed Inclusion Competency Trainings • 15% of staff attended the Undoing Institutionalized Racism Workshop
		Meet or exceed workforce diversity goals for construction contractors Goals: • 21% people of color • 12% women • 20% apprentices	% of hours worked by diverse communities on ST job sites	• 29% by people of color • 7% by women • 20% by apprentices	• 32% by people of color • 7% by women • 18% by apprentices
	All staff champion sustainability	Certify key staff to green design and building management professional accreditations	# of staff trained to sustainable professional accreditations	• 22 new Envision Sustainability Professionals • 17 new LEED Accredited Professionals • 5 other new sustainability certifications	• 34 Envision Sustainability Professionals • 22 LEED Accredited Professionals • 12 other new sustainability certifications

PRIORITY	LONG-TERM GOALS	APPLICABLE SHORT-TERM GOALS	KEY PERFORANCE INDICATOR	2018 BASELINE VALUE	2020 VALUE AND/OR PERCENT CHANGE
Planet	Achieve carbon free operations	Reduce greenhouse gas emissions by 10 percent	% change in greenhouse gas emissions	66,206 tonnes of CO2e	49,199 tonnes of CO2e; 26% reduction since 2018*
			% change in criteria air pollutants	• Particulate Matter: 11,078 lbs • Volatile Organic Compounds: 15,485 lbs • NOx: 399,828 lbs • CO: 193,411 lbs • SOx: 9,986 lbs	• Particulate Matter: 9,443 lbs; 15% decrease since 2018* • Volatile Organic Compounds: 16,201 lbs; 5% increase since 2018* • NOx: 384,164 lbs; 4% decrease since 2018* • CO: 217,200 lbs; 12% increase since 2018* • SOx: 8,077 lbs; 19% decrease since 2018*
		Increase production from solar panels to 750 KW	# of kW of renewable energy production	• 76,257 kWh produced • 2.1 KW installed	• 48,460 kWh produced
		Purchase available cost-effective, carbon-free electricity	% change in renewable electricity procurement	84% electricity from clean and renewable sources	89% electricity from renewables in 2019; 6% increase since 2018
		Decrease total energy use 5 percent for all facilities built before 2018	% of facility energy reduced	170,516 MMBtu	152,390 MMBtu; 11% reduction since 2018*
	Enhance ecosystem functions	Achieve 100 percent environmental compliance (zero fineable violations)	# of fineable environmental compliance violations	Four	Two
		Reduce total water use by 10 percent at all existing facilities and sites established before 2018	% change in agency water use	27,521 CCF used	30,626 CCF used; 11% increase since 2018
Prosperity	Build resilience to climate change and natural or manmade disasters	Develop staff awareness of individual roles in emergency prepared	% of staff trained in emergency preparedness	Training began in 2019	68% of staff trained

PRIORITY	LONG-TERM GOALS	APPLICABLE SHORT-TERM GOALS	KEY PERFORANCE INDICATOR	2018 BASELINE VALUE	2020 VALUE AND/OR PERCENT CHANGE
		Conduct a Climate Vulnerability Assessment as part of each major system capital expansion project	% of projects that include Climate Change Vulnerability Assessments	Assessments began in 2019	100% of eligible projects
	Maximize operational efficiency	Divert 50 percent of office waste to recycling or compost	% of waste diverted	35%	31%*
		Include green methods or features in at least 75 percent of all new agency procurements	% increase in # of and dollar value of procurements	• 15% of new procurements • $299M in value	• 20 procurements – 43% overall and a 187% increase since 2018 • $128M in value – 57% change since 2018

* Key Performance Indicator was significantly impacted by reduced ridership, reduced resource use, and/or employee's working remotely due to the COVID-19 pandemic.